MATH ATTITUDES

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In talking with elementary teachers, I have come to the uneasy realization that most elementary teachers do not realize how very critical their collective efforts are in developing a solid base for their students' future math success. Further, they are unaware of how appreciative high school teachers are of their efforts. Most are sure that the basic number facts are important, but don't know how dependent we are on their introduction and development of the number line concept, the various number properties, and order of operations concept. It is not my intent to discuss these concepts, though, be assured, they are extremely important. Rather, I'd like to discuss something even more crucial to future math success – the attitudes and habits our elementary teachers develop and nurture in their students.

Developing Thinking Skills

Few can disagree that the world we now live in is different from the one in which we grew up. One of the forces negatively impacting the development of reasoning and calculating in our children is the games children now play at home. Board games such as Monopoly, Conflict, and Stratego, and card games such as Hearts, Euchre, and Rummy made reasoning and calculating fun. Nintendo, Atari, and Sega develop quick fingers and good reaction time. The future of piano and guitar certainly looks brighter. One of our first tasks is to emphasize constantly the fun of logic and calculating. Pure math is essentially just a game for which we've made up rules. Tests are merely games of solitaire. A teacher is definitely NOT doing an injustice to math by making it fun. It is vital to seek games to incorporate into your class.

Once students realize that math can be fun, it's a game, it's okay to lose, and skills can be improved by playing more, we can work on developing their thinking skills. A bank of thought-provoking problems is a necessity at each grade level. Good problems afford the individual or small group the opportunity to develop thinking skills by drawing pictures, making tables, and organizing data even though the problems may not be successfully solved. Here are some representative types from the calendar section of the *Mathematics Teacher*:

1. How many more diagonals are in an octagon than a hexagon?
2. In how many ways can you make change for a 50 cent piece without using pennies?
3. Darryl ate 100 peanut butter cups in five days. Each day he ate six more than he ate the previous day. How many peanut butter cups did Darryl eat on the first day?

Collect the data. Experiment. Draw conclusions. Does my answer make sense? What's the right answer? Where did I go wrong? All are ingredients in solving a problem. All are facets in math that must be worked on from grades 1 to 12.

Overcoming Fear of Making Mistakes

Once the students realize the difficulty and challenge of these problems, we can work on overcoming the fear of making mistakes. Students need to be constantly reassured that it's okay to make mistakes. It's one of the ways to learn math. No one knows it all. The most brilliant mathematician in the world may well know less than 50% of all the math there is to know.

Memorizing

Rote memorization still plays an important role in developing math skills. Some facts simply must be memorized. Basic addition, subtraction, multiplication, and division facts, definitions, and names for geometrical shapes fall into this category. There's no more understanding involved in knowing that a triangle is a three-sided polygon than there is in knowing that grass is green, fire engines are red, and $\sin \theta = y/r$. Our students must realize that memorizing is a part of any study of mathematics. Much of what must be memorized initially will be understood eventually. To think that you have to "understand" something or you really don't "know" it is not always so. You knew that 9×10 was 90 long before you understood why.

Developing Work Habits

Learning math is a daily process. It cannot be learned in the same manner that you and I wrote our English and Education papers in college. There's no way one can experiment and assimilate all the material covered in even a two week period in six hours the night before a test. By the time children reach middle school, homework in math should be part of their school day; it should be expected by the students. Math homework must become habit.

Developing Number Sense and Estimation Skills

Finally, we need to develop better number sense and estimating skills. Our national debt is 2.6 trillion dollars. This year's deficit is supposed to be 120 billion dollars. A school district is 3.1 million dollars in debt. To most, these three numbers might elicit a "Whew!", but little realization of how they compare relative to each other. Most of us were aghast at the Exxon Valdez accident, but how many of us can appreciate the maneuverability problems that arise with a 900-foot tanker? How big is the AIDS virus? Do you realize your chance of winning the jackpot in the Ohio Lottery is 1 in 7.06 million?

All of the above are headline items. As educated people and informed consumers we have an obligation to have some sense for large numbers, small numbers, and probability. Our students won't really need to know how to multiply 365 × 4967. But they must realize that the product has to be about 2 million.

We all know facts are important. They're also easy to teach, but most of us didn't choose this profession because it's easy. We chose it, in part, because we thought we'd be good at it. We could help someone and enjoy what we're doing at the same time. If you really want to do some good, if you really want to enjoy your job, make developing these habits and attitudes your prime consideration.

References

"A 900-Foot Tanker Just Doesn't Handle Quite Like a Honda". *The Wall Street Journal.* April 14, 1989.

"Calendar Centerfolds". *Mathematics Teacher.* National Council of Teachers of Mathematics, Volume 82.

"Federal Budget Summary". *Statistical Abstract of the United States – 1989.* U.S. Department of Commerce, Bureau of the Census, Page 303.

Paulos, John Allen. *Innumeracy: Mathematical Illiteracy and Its Consequences.* Hill and Wang, 1988.

"Public Debt of the United States". *The World Almanac*, 1988. Page 96.

MATH SCRAMBLER answers: MINUS WHOLE HEIGHT SECOND LUNCH